

OPPORTUNITIES IN THIRD PARTY MAINTENANCE

INPUT



An Analysis of Regional Bell Operating Company Service
and Opportunities in the Third Party Maintenance Market

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I. Introduction

This report was prepared for the exclusive use of NYNEX Corporation, based on NYNEX requirements as documented in INPUT's proposal dated January 9, 1986.

The object of the study was twofold. First, to provide competitive information on nonregulated services offered by five Regional Bell Operating Companies:

PacTel.

U S West.

BellSouth.

Ameritech.

Southwestern Bell.

The second part of the study focused on service revenues and profitability for two major Third Party Maintenance (TPM) vendors and for the TPM industry as a whole. These vendors include:

TRW.

Grumman.

The second section would, when possible, also address factors which might impact profitability, such as contract size, logistics operations , etc.



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The sources used in this study were:

Data from the INPUT Computer Industry library.

DIALOG search of business and computer data bases.

Telephone interviews with current and past staff from all seven of the vendors listed above, as well as competitors of these companies.

In all cases no attempt was made to access proprietary files or information sources but only to gather and analyze data freely available to the public. The "added value" of the INPUT study was to synthesize many data sources, including numerous INPUT research reports, and interpret the data in light of the specific requirement of the client, NYNEX.

The study was performed in three stages:

First, INPUT performed a thorough background search of the trade press and INPUT's research files. In addition, the research staff accessed a number of public data bases to ensure that valuable research was not overlooked. Also, internal reviews with INPUT's Customer Service staff and senior managers were conducted to get feedback on related issues.

The second stage of the research consisted of telephone interviews with all of the companies listed above. In many cases, such as with the RBOCs, numerous calls were made in order to ensure comprehensiveness within these rapidly changing

corporate structures.

The third stage was the synthesis of the data, interpretation of the data relative to the requirements listed above, and the writing of the report to document the findings.

Because of time limitations, INPUT was not able to able to fully analyze many of the divergent trends which exist in the markets covered in this study. However, NYNEX may, for a period of 30 days starting from the receipt of this report, consult with INPUT at no extra cost on the content of this report.

II Regional Bell Operating Company Service

A. Pacific Telesis

There are three nonregulated service organizations in PacTel which are essentially independent groups. These organizations include:

PacTel Infosystems.

PacTel Communications.

PacTel Spectrum.

Because Pacific Telesis has aimed their service organizations at a wide audience, one would expect a high level of cooperation between each service group. Input believes, however, that this cooperation does not yet exist. Infosystems concentrates primarily on selling and servicing microcomputer and key systems to small business.

Communications is charged with selling and servicing larger PBX switches and higher end computer systems. Spectrum service concentrates on providing "network assurance" services to companies with large multivendor systems.

1. PacTel Infosystems Service

Infosystems is primarily a retail chain providing service for the microcomputers and local area networks that they sell. Infosystems carries a wide variety of products including IBM PCs, Apple MacIntosh, and Compaq PCs. In addition, the company carries 3Com and IBM LANs, TIE key systems, and a variety of peripherals.

Retail outlets have been established in five northern California locations and the company has purchased the Byteshops retail chain consisting of eight outlets in the Pacific Northwest. Infosystems has a total of 13 outlets at this time, and INPUT expects this number to increase dramatically in the next 2-3 years.

Service from the Infosystems group is provided in one of three forms:

- On-site at the corporate level.

- At the retail outlet on a depot basis.

- Subcontracted to an established TPM vendor.

Service offerings include:

- Contract service. Contracts typically cover one year and price is calculated by the component item. Service calls are routed through a dispatch center and the technician will call the user to predetermine the need for parts or test equipment. Loaners are available for customers who choose to have carry-in/mail-in service.

- Priority Time and Materials service. Using this option, the user pays up front for per call service to receive priority service. Under this plan, estimated service costs are established and placed in a fund; if and when service calls are made, payment is deducted. Costs for this option are

approximately 60% below the traditional on-site contract service.

TSG (Technical Support Group). Users may contract to receive only hotline support via Infosystems Technical Support Group. The hotline operates 6 days a week and the user can select from plans allowing for 25 calls at \$395 or 50 calls for \$695 per year.

2. PacTel Communications Systems Service

Communications, as noted above, specializes in selling and servicing high-end computer and telecommunications systems. This division services:

Data General mini and superminicomputers and peripherals.

Codex and UDS modems.

Timeplex multiplexers.

TIE and Northern Telecom switches.

The Communications division has sales and service offices throughout California and Nevada: six regions with 8 service locations in total. Trouble calls are initially sent to the company's central service facility at Walnut Creek, CA, for primary diagnostics. INPUT estimates that the Communications division has 500 total service staff with 300 technicians.

3. PacTel Spectrum Service

Spectrum was only recently announced by PacTel and does not provide service in the traditional sense. PacTel indicated that Spectrum is not directly involved with "physical service," but rather provides network control services for specialty systems. Some of the services offered by Spectrum include:

System management.

Problem diagnostics.

System troubleshooting.

Problem resolution coordination (only).

Design/growth consulting.

Currently, the three service groups at PacTel operate independently. In the long term, however, INPUT expects the company to integrate service to a much greater extent. Coordination will be demanded by PacTel's customer base, particularly the large users who will deal with all three service units.

In addition to the integration of the service groups, INPUT expects PacTel to centralize their service facilities, probably in Walnut Creek, CA. This centralization will make possible a very high level of remote support. This is considered by company officials to be essential to the long-term success of the service operations.

INPUT believes that it is unlikely that PacTel will enter the traditional third party maintenance market, at least in the next 2-3 years. Despite the fact that the company will have a trained service staff specializing in popular products, such as IBM and Data General computers, PacTel will focus their attention on serving their own installed base. By 1988/89, however, INPUT expects PacTel to enter the TPM market. Their entry will be necessary for the company to ensure adequate account control in the face of increasing competition from major computer vendors (e.g., IBM) as well as other RBOCs, such as U S West.

B. U S West

U S West is the \$7 billion conglomeration of three Bell Operating Companies (Mountain Bell, Northwestern Bell, and Pacific Northwest Bell) that provide telephone service primarily in the west/northwestern US. Since deregulation, the company has restructured its unregulated sales force and included Interline, the company's service group, to form U S West Information Systems.

Information Systems sells and services a number of data processing and telecommunications products, including:

- IBM and Grid microcomputers.

- General DataComm modems and multiplexers.

- NEC, Siemens, AT&T, Northern Telecom, Mitel, Harris, and Centrex PBXs and key systems.

Interline is viewed as U S West's primary service division. Service is provided from 45 branch offices in 36 states. The division has over 900 employees, 56% of whom are certified technicians. A few of the 45 locations are strictly service offices, but most serve as both sales and service sites.

Interline sees itself primarily as a multivendor telecommunications service company. Although they do sell some equipment (usually changes, additions, and upgrades), this is not their primary business. They offer installation, maintenance, support, cabling (a substantial

portion of their business), and some consulting on a variety of PBX and key systems noted above. Obviously, as U S West begins to sell data processing equipment and local area networks, Interline will be ready to support these products as well, preventing other TPMs from subcontracting maintenance services.

Interline offers three basic maintenance packages:

Basic service includes two-hour response time, 8 hour coverage 5 days per week, and parts and preventive maintenance at no additional charge.

Extended service includes all of the above in addition to 24X7 coverage, standard communications consulting, user training, and telco coordination.

In addition to the two plans listed above, Interline also provides a time and materials contract option with a four-hour response time.

U S West Information Systems' strategy is to grow within the telecommunications sales and service business first rather than concentrate on retail sales of data processing equipment. While personal computers are available from U S West, they are sold primarily as terminals rather than independent, standalone units.

This sales and service strategy is in sharp contrast to other RBOCs, such as NYNEX, PacTel, and Bell Atlantic. These vendors have been aggressive in developing a retail network and, as a result, have often ended up with two distinct service organizations. PacTel, for example, has the Infosystems and Communication divisions, and Bell Atlantic has its Sorbus and Information Products and Services groups.

INPUT believes that the service strategy at U S West is a good one in that the company's strengths are emphasized during this period of confusion resulting from divestiture. In the long run, however, the goal of systems integration will force the Denver-based company to expand beyond telecommunications products alone and into the area of data processing equipment.

Interline can serve as an excellent base for expansion into the data processing service environment in that they already have an established service organization. INPUT does not expect U S West to enter the independent TPM market, but rather to expand Interline into a national service organization and use this service base as a selling tool for national accounts. This may represent a lost opportunity for U S West, considering the high demand for telecom service and the relatively high level of dissatisfaction with the service currently available.

C. BellSouth

BellSouth, one of the larger RBOCs, provides primary telecommunications coverage in the nine-state southeastern region. While the company has clearly defined its current business, BellSouth has not been as aggressive as companies such as Bell Atlantic or PacTel in developing service markets. However, BellSouth Advanced Systems president, Mike Harrell, has been quoted as saying that service is critical to the company's strategic plans.

Nonregulated information services and products are the business of BellSouth's Advanced Systems subsidiary. Organizationally, Advanced Systems has two regional marketing groups: South Central Bell Advanced Systems and Southern Bell Advanced Systems. Both groups have targeted mid-range companies (less than 1000 employees and \$100 million) as their main markets. And both groups have indicated that in order to be competitive with national organizations, such as AT&T and IBM, they must develop a systems integration and service image.

Each of the regional marketing organizations is responsible for servicing the equipment they sell. This equipment includes:

- IBM mainframes and minicomputers.

- IBM and DEC microcomputers and peripherals.

- FiberLAN local area networks.

- UDS, Paradyne, and Northern Telecom modems.

- Paradyne multiplexers.

- Northern Telecom, InteCom, ATI, ITT, Amtel, and CXC PBXs.

BellSouth has repair or service centers in over 80 cities in the south-east. Dispatching is initiated on the local level although there is specialization by product type and "cross over service" in some cases. Dedicated field engineers are available.

While the regional Advanced Systems groups are responsible for most service calls, BellSouth headquarters does provide access to a technical staff via the RMAC (Remote Maintenance Assistance Center), an 800 number available for any problem with voice or data equipment. RMAC provides not only access to technicians, but also remote diagnostics.

Service contract features are negotiated at the time of installation. Levels of service include response time, equipment priority, installation, coverage times, etc. Contracts are negotiated on an annual basis.

Although BellSouth has indicated that it does not plan to enter the TPM market, INPUT believes that the company has not yet ruled out this option. The company is well structured to provide service not just in the southeast, but, with its National Accounts Program, in the rest of the nation as well. Considering the emphasis BellSouth is placing on systems integration, INPUT believes that it is probable that the company will offer at least limited TPM service in order to maintain account control.

It is difficult to establish what service trends exist at BellSouth because the company seems to be sending out conflicting signals. For example, the company has publicized their desire to target mid-range companies, and yet they have established a National Accounts program. The company has indicated that it does not plan to enter the TPM market, but with more service locations and a larger DP/Telecom product line, this is a natural market for BellSouth.

Overall, INPUT expects BellSouth to take a conservative course in the service market. Service will aim primarily to satisfy the current user base, but will not be promoted as an independent service unit. As competition from industry giants, such as IBM and AT&T, begins to impact their regional business, INPUT believes that BellSouth will emphasize their service business more.

D. Ameritech

Ameritech, unlike most of the other RBOCs, has not yet made a sustained effort in the data processing market despite the fact that it refers to itself as an office automation vendor. The company is clearly trying to leverage its telecommunications image by expanding nonregulated service and support for a variety of voice/data products. Equipment sold by Ameritech includes:

Telex 3270 terminals and printers.

General DataComm modems and multiplexers.

NEC, Ericsson, Northern Telecom, and AT&T PBXs and key systems.

The company's strategy is to enhance communication products to serve both voice and data. To this end, Ameritech can add data communication capabilities to Centrex or Dimension switching systems by using the Information Manager from David Systems, Inc.

Service to Ameritech-sold equipment is provided through the company's subsidiary, Ameritech Communications, Inc., based in Chicago.

Currently, the company has at least one service office in each of the five northcentral states for which it has primary coverage. An Ameritech spokesman said that the company wanted to have a service office teamed with each sales office; however, the company would wait until the business developed before any service office was opened.

Service on the local level is supplemented by Ameritech's National

Service Center in Chicago. This center provides 24-hour access not just for field technicians, but for end users as well. Service coordination, parts allocation, and, when necessary, dispatching are major functions of the National Center. In addition, staff technicians perform remote diagnostics and fixes on PBXs from the Center.

All repairs are handled on-site or by remote support; the company does not utilize depot or factory repair/return options as do some other RBOCs. (Some products which are under warranty may be returned to the manufacturer for repair, but only because this is required by the manufacturer rather than Ameritech.)

Ameritech does have access to its wholly owned third party maintenance company, Communication Contractors Inc. CCI will perform some installation and maintenance for Ameritech; however, CCI maintains non-Ameritech systems as well. In addition, Ameritech has contracted to have Western Union service some regulated customer premise equipment.

While service is definitely emphasized by Ameritech corporate officers, the company does not appear to have any plans to expand service into an identifiable product. Rather, the current emphasis is on using service as another selling feature for telecommunications products. It seems likely that as the Chicago-based company expands into the office automation market, an increased product line to include data processing equipment will be necessary. This expansion will be difficult if Ameritech does not have the necessary service

foundation to build upon. If the company's current service strategy continues, INPUT believes that the option to "grow" a service organization will be severely restricted and that the company will be forced to expand its TPM agreements or to purchase a service vendor.

E. Southwestern Bell

"We are and are not in office automation" is probably as accurate a statement on Southwestern Bell's strategy as can be made at this time. The statement, made by Jack Zaloudek, Vice President of the company's Business Systems Div., is characteristic of the wait and see attitude of Southwestern Bell's top planners. This attitude extends to service, where SW Bell has been among the least aggressive of the RBOCs.

Southwestern Bell, headquartered in St. Louis, offers primary communication coverage in five states (Arkansas, Kansas, Missouri, Oklahoma, and Texas). Since divestiture, SW Bell has concentrated almost exclusively on communication products. Currently, the only data processing equipment the company sells and services are Epson and Texas Instruments printers. However, even in the communications area, SW Bell's product line is limited. The company sells Northern Telecom, InteCom, and American Tel Communications PBXs.

The Business Systems Division of Southwestern Bell markets and services nonregulated equipment. Information Systems Integrators, a separate division, does provide consulting and, on occasion, installation services.

Service in the five-state region is provided by 13 offices, which correspond to, but are not part of, sales offices. Each service office supports the equipment sold by the local sales office. All systems are under a one-year warranty. Service contracts are

available after the first year and continue the warranty coverage; i.e., all components are totally guaranteed and serviced through SW Bell. Users can select service on a Time and Material basis if they choose, but a SW Bell spokesman said this was not common considering the complexity and importance of most of the PBX systems sold by SW Bell.

As noted above, each service office within the Business Systems Division operates essentially as an independent group. INPUT believes that SW Bell is currently developing a central service center which will not only coordinate dispatching and logistics, but will also provide a national accounts capability.

SW Bell has indicated that it intends to enter the office automation market in 1986. To do so, the company will not only have to offer more, or for that matter any, data processing products, but they will also have to enhance their service organization considerably. INPUT sees little or no indication that the company is prepared to expend the necessary resources to develop their service capabilities. It is likely that service will be restricted to supporting their current product line rather than expanding as an identifiable product or profit center.

F. RBOC Service Trend Analysis

INPUT believes that there are three major trends that will impact the level of service provided by the Regional Bell Operating Companies.

The continuing deregulation of the telecommunications industry.

Fundamental changes in the telecom service market.

The impact of computer service on the telecom market.

1. Deregulation of the Telecommunications Industry

All of the RBOCs interviewed for this report express concern about the continued regulation of their service business, particularly related to telephone service. Vendors complain that there is a natural synergy between their regulated communications service and unregulated information systems service. Hoping to take advantage of this synergy, some RBOCs seem to be very hesitant about developing their information systems service. They are taking a wait and see attitude before expending the necessary capital for what they see as potentially a duplicate service organization.

Several RBOCs, notably PacTel and Bell Atlantic, have been very aggressive in developing a separate, nonregulated service organization and have not been deterred by the prospect of inefficiencies resulting from potential duplication. However, even these companies have yet to determine where their computer service groups fit in what is still primarily a telecommunications business.

2. The Telecommunications Service Market

A second major factor which is shaping RBOC service patterns is the rapidly changing telecommunications service market. While the companies INPUT interviewed have all begun to sell and service a variety of PBXs, modems, multiplexers, and other telecom products, these companies are frequently in competition with the manufacturers for the end users' service dollar.

The market for telecommunications service is changing rapidly because vendors have begun to recognize the opportunities inherent in this market.

Telecom service in the US generated close to \$1 billion in 1985 and is expected to exceed \$3 billion by 1990.

Telecom service is the fastest growing of all the "high tech" service markets--28% average annual growth rate through 1990.

Computer hardware manufacturers, in particular, are beginning to realize the necessity of providing telecom support to their data processing customers.

Distributors, such as the RBOCs, are being faced with an increasingly aggressive competitor in the form of the telecom equipment manufacturer. Frequently, the manufacturer can offer the large end user better service than the distributor as a result of improved

diagnostics, parts availability, and engineer training.

RBOCs have reacted to this increased competition in a number of ways. Companies like Southwestern Bell have opted not to participate in a number of data processing and telecom markets at this time. Other companies, like BellSouth, have chosen to specialize in serving the needs of smaller companies where the competition with the manufacturers is less intense. Still other companies, such as Bell Atlantic and NYNEX, have apparently decided to compete head on with any and all competitors.

Changes in the telecommunications service market are best illustrated in the area of office automation--a market that all the RBOCs have targeted. Telecom vendors believe they have a competitive advantage in this market because end users are familiar with their service and products and because of the growing demand for voice/data transmission. The telecom vendors are finding, however, that end users are demanding not just improved telecommunications service, but a true integration of telecom and data processing. Computer vendors, such as IBM and DEC, have also recognized this trend and are increasing their commitment as well.

Overall, the telecommunications service market is growing rapidly. However, increasing competition from large distributors (e.g., RBOCs), telecom manufacturers, and computer manufacturers is likely to mature this market faster than was expected at the time of AT&T's divestiture.

3. Impact of Computer Service on the Telecom Service Market

As noted above, telecom service before divestiture was quite different than the service offered today. Predivestiture service of nonregulated telecom equipment was frequently supplied by independent manufacturer representatives or distributors. Manufacturers of high reliability devices, such as modems and converters, frequently offered mail-in factory repair service in order to supplement service by independent vendors.

In addition to delivery mode, telecom service pricing was established in a different manner in the past. Vendors and distributors frequently set prices according to the number of ports or lines serviced.

The increase in user demand has led to changes in both service delivery mode and pricing. In many ways, telecom service is following a pattern developed by the computer service industry.

Growing user dependence on equipment has resulted in a demand for a higher level of service.

The demand for a single source of service has prompted the growth of professional services.

The user base is becoming segmented.

Third party maintenance is beginning to have an impact.

a. Increasing user demand for telecom service

User demand for telecom service is increasing faster than any other service market according to a recent INPUT study. Telecom user requirements for key services, such as response time, parts availability, and engineer skill level, meet or exceed data processing user requirements. Vendor performance has not kept pace with this increase in user demand for service, and, as a result, over 80% of telecom users are dissatisfied with service. These users become vulnerable, but to whom? INPUT believes that third party maintenance vendors and computer manufacturers will try to seize the opportunity and expand into the rapidly growing telecom service market.

Users cite several major problems in telecom service:

The average number of hardware interruptions per month (6) is far too high considering the growing dependence on the equipment.

Response time is, on average, 41% slower than required.

Repair time is 125% slower than required.

As a result of inadequate performance by many of the telecom service vendors, many end users have opted to develop internal support procedures. Over 44% of all budgeted monies for telecommunications service is spent internally.

b. Growth of Professional Services

INPUT projects that professional services (e.g., consulting and planning) are among the fastest growing computer services. Professional telecom services are growing as well as users look for assistance in developing voice/data networks.

Telecom users are very similar to DP users in that "finger pointing" between service engineers is considered to be a major problem. Users believe that a single source of maintenance is best way to overcome lack of coordination between service vendors. Professional services are considered essential to single-source maintenance because it allows one vendor to enter at the planning and consulting stage and carry the project through to completion.

Several RBOCs have admitted privately that their lack of experience in servicing data processing equipment has hurt them. Users question whether the vendor has the necessary skill in developing the DP/Telecom link. The telecom vendors have responded by emphasizing the central switch as the heart of the network; however, many users are not yet convinced that this will be adequate to meet their needs.

c. Segmentation of the user base

As user expectations for service have increased, INPUT has identified a clear segmentation in both the data processing and telecommunications service markets. Typically, large end users have

a much higher requirement for service and are willing to pay substantial premiums to get the level of service they need. Smaller users tend to be more price sensitive and discriminating about the service they require.

Data processing service vendors have been very active in adapting to this segmentation in their market. Companies like DEC have introduced a variety of service "products" to accommodate the changing needs of their user base. Telecom vendors, on the other hand, have been spending much of their service resources just trying to meet user needs for service. INPUT believes, however, that the same pattern of segmentation exists in the DP and telecom markets.

Three distinct segments exist in the service market:

Price sensitive users, comprising between 10-15% of the market, who will accept a lower level of service, but also require discounts in service pricing.

Most telecom users (70-80%) feel that the majority of the services offered are adequate, and the prices are generally considered acceptable.

A small but growing number of users (10-15%) require a much higher level of service than currently exists. These users frequently develop internal support mechanisms to compensate for the lack of support from the manufacturer or distributor.

However, these users are not service price sensitive and are willing to pay premiums to receive the level of support they require.

d. Third Party Maintenance

Third Party Maintenance (TPM) has existed in the computer industry for decades, but the growth in the last few years has been much higher than in the past. Growth has been escalating for a number of reasons:

There is an increasing number of mixed-vendor user sites.

Many small manufacturers have been reluctant to spend the necessary capital in order to develop a service network and have had to depend on TPM vendors for service.

TPM vendors have been very price competitive, frequently charging 10-15% less for service contracts.

Currently, less than 5% of telecom users have contracts with TPM vendors, but INPUT expects this number to increase dramatically in the next five years. Overall, INPUT projects a 17% average annual growth rate for the computer/telecom service market, but the telecom TPM service market is expected to increase by 31% AAGR through 1990.

TPM service in the telecom market will increase for many of the reasons listed above, most of which relate to the fact that the manufacturer/distributor is not providing the level of service

required by the user, and, consequently, the user looks for new sources of service.

RBOCs will be affected by the growth in TPM competition, not just in price, but also in the level and quality of the services offered.

Vendors such as TRW and CDC have developed extensive support services including some telecom service. In addition, a number of computer manufacturers have been entering the telecom service market via acquisitions of or strategic partnering with telecom vendors.

As with the computer service market, third party maintenance competition will serve to increase user expectations for service by providing a number of options. However, INPUT expects TPM vendors to be very focused initially, and this will provide the RBOCs with an opportunity to differentiate themselves from these competitors.

III Profitability in the Third Party Maintenance Market

A. Overall TPM Market, 1985-1990

Third party maintenance (TPM) is a \$1.3 billion market in 1985 and is expected to outperform the overall service market in terms of growth through 1990. INPUT projects that TPM service revenues will increase at an annual growth rate of just under 18% between 1985 and 1990 compared to the overall service market growth of just under 17% annually.

In addition to the traditional hardware TPM revenue, Exhibits III-1 and III-2 demonstrate that there are a number of nontraditional services which are increasing total TPM revenues by an even faster rate:

Product refurbishment is growing at 20% AAGR

Fourth party maintenance, 26% AAGR

Software consulting, 22% AAGR

When all TPM and related services are totaled, this market is expected to increase from just under \$2 billion in 1985 to over \$4 billion in 1990. By the end of the decade, Third party maintenance will represent almost 15% of the total computer/telecommunications service market in the United States.

While INPUT expects a steady growth in the TPM market, revenue increases will not be uniform in all sectors of the market. As

EXHIBIT III-1

THIRD-PARTY SERVICE MARKETS, 1985-1990

HARDWARE MAINTENANCE SERVICE MARKETS	\$ MILLIONS						
	1985	1986	1987	1988	1989	1990	%AAGR
Maintenance							
Mainframes	\$ 170	\$ 177	\$ 184	\$ 191	\$ 199	\$ 208	4%
Minicomputers	200	232	267	307	353	402	15
Peripherals	250	275	303	333	366	399	10
Terminals	140	172	212	258	313	378	22
PCs	390	472	571	685	815	970	20
Telecomms	130	172	227	297	389	509	31
Other	50	60	72	86	103	121	19
Subtotal	\$1,330	\$1,560	\$1,836	\$2,158	\$2,537	\$2,987	18%
Product Refurbishment							
Subtotal	\$ 25	\$ 30	\$ 36	\$ 43	\$ 52	\$ 62	20%
Fourth-Party Maintenance							
Subtotal	\$ 70	\$ 88	\$ 111	\$ 140	\$ 176	\$ 220	26%
Hardware Services							
Total	\$1,425	\$1,678	\$1,983	\$2,340	\$2,766	\$3,269	18%

EXHIBIT III-2

THIRD-PARTY SERVICE MARKETS, 1985-1990

SOFT SUPPORT SERVICE MARKETS	\$ MILLIONS						
	1985	1986	1987	1988	1989	1990	%AAGR
Leasing	\$350	\$389	\$431	\$479	\$531	\$590	11%
Software Support/ File Conversion	5	15	35	65	91	127	91
Consulting/Planning	15	19	24	31	36	41	22
Education/Documentation	20	24	30	38	44	50	20
System Installation/ Deinstallation	22	25	29	33	38	44	15
Soft Services							
Total	\$412	\$472	\$549	\$646	\$740	\$852	16%

demonstrated below, some sectors, such as telecom and terminal service, will experience much faster growth than other sectors, such as mainframe and peripherals service.

TPM Sector	% AAGR
Telecommunications	31%
Terminals	22
Microcomputers	20
Software Support	16
Minicomputers	15
Peripherals	10
Mainframes	4
TOTAL	18%

Growth in the TPM sectors will vary as a result of a number of factors:

Telecommunications growth will be influenced by the increasing demand for integrated voice/data services and by growing equipment sales.

Microcomputer service will be tied to equipment sales. Although prices for PCs will fall, INPUT expects an increased volume to make up for a projected decrease in average contract size.

Terminals service will continue to grow at a rapid rate, but

profit margins will be low (as described below).

Mainframe, peripherals, and minicomputer TPM growth will be limited through the end of the decade by increasing manufacturer competition.

Fourth party maintenance (vendors who perform services for TPM vendors rather than the end user) are expected to grow rapidly as a result of the continued growth in the number of TPM vendors. Parts supply will be a major subsector growth area.

Software support and affiliated services (e.g., education and training) will be one of the fastest TPM growth areas due to very high levels of user demand.

In addition to the dominance of particular product sectors in the TPM market, the changing mix of TPM vendors will have a major impact on growth in the market. As Exhibit III-3 demonstrates, independent TPM vendors will lose market share to hardware manufacturers, both telecom and computer. Hardware manufacturers are entering the market for a number of reasons:

Rapid growth in revenues.

An increase in the number of mixed-vendor sites.

An excess capacity of service staff.

To protect their installed base.

INPUT®

MANUFACTURERS' ENTRY INTO TPM

MARKET SHARE 1985 (Percent)	SUPPLIER	MARKET SHARE 1990 (Percent)
82%	Independent TPM	65%
12%	Equipment Mfr.	29%
5%	Depot Repair	5%
1%	Other	1%
\$1,330 Million	Market Size	\$2,988 Million

Most manufacturers enter the TPM business for one of two reasons: to protect their installed base from TPM competition, or to increase service revenue. However, once the vendor enters the market, the prospects for increased revenues and more efficient use of staff become important inducements for staying in third party maintenance.

In 1985 INPUT has seen a determined TPM effort on the part of numerous manufacturers including NCR, Honeywell, CDC, Sperry, DEC, and others. A number of companies, including Datapoint and M D S, have established separate TPM service groups. It was when IBM entered the TPM market, however, that the industry was most surprised. IBM has announced that it will service a number of non-IBM products, mostly in the PC area, which are sold by IBM through their retail outlets.

INPUT does not expect IBM to become a major force in the TPM market in large part because the revenues are not substantial enough for the Armonk-based company to risk its own excellent reputation for service on other vendors' products. However, INPUT does expect continued pressure from the other manufacturers mentioned above. Manufacturers will have a major impact on the TPM market, capturing almost one-third of it by 1990.

Despite the substantial gains made by hardware manufacturers, INPUT does not believe that manufacturers will displace any of the top TPM vendors, as shown in Exhibit III-4. The top 10 TPM vendors in 1990 are expected to have an average annual growth rate of 20%, substantially faster than the overall service industry.

EXHIBIT III-4

PROJECTED COMPETITION IN 1990

RANK		VENDOR	\$ MILLIONS						
1990	1985		1985	1986	1987	1988	1989	1990	%AAGR
1	1	TRW	\$232	\$271	\$315	\$365	\$420	\$483	16%
2	4	GE/RCA	154	195	244	302	371	457	24
3	2	Sorbus	202	238	281	332	388	454	18
4	3	Control Data	110	121	133	146	161	177	10
5	12	DataServ	19	30	44	60	80	104	41
6	9	TTS	21	32	43	55	72	93	35
7	7	Grumman	30	41	53	66	79	93	25
8	8	First Data Resources	22	30	39	50	65	84	31
9	6	Bell & Howell	38	44	51	59	69	80	16
10	7	McDonnell Douglas	22	27	32	39	46	56	20

B. Overview of TPM Profitability

1. Average Expense/Profit Profile

As noted above, INPUT expects the TPM industry to grow faster than the overall service market through the end of the decade. This growth has been a major inducement for a number of vendors to enter the TPM market; vendors who wish to build revenues, increase market share, and make more efficient use of their current service staff. As competition increases, however, INPUT believes that long-term profitability will be the key to TPM success.

Based on interviews with over 400 TPM vendors over the last two years, INPUT has developed the average TPM vendor profit profile shown in Exhibit III-5. Overall profitability is expected to decline between 1985-1990 as a result of increased expenses, despite the fact that most TPM vendors have been very active in cost control.

Revenue derived from contracts will increase substantially between 1985 and 1990 as a result of growing flexibility in TPM contract coverage. In order to develop or maintain account control, TPM vendors will offer contracts which allow for incremental coverage so that as the user requires service over and above base coverage, the vendor will charge an additional fee. TPM vendors see several of advantages to this type of coverage.

Initial service prices are kept low.

Additional service costs are passed on to the users who require the support rather than the entire user base.

As a result of the increase in contract coverage, INPUT projects a decline in Time and Material calls. While there will always be a market for non-contract service, INPUT believes that increased flexibility will encourage users to select at least minimal contract coverage.

A second factor which will lead to less T&M revenue is the increasing user dependence on DP and telecom equipment. As dependence increases, users are more likely to select contract service in order to ensure a high level of service availability.

On the expense side of the profit profile, direct labor, which had been the most rapidly growing expense item, is expected to decline between 1985 and 1990. This decline is the result of aggressive cost cutting and alternative delivery of service by many TPM vendors. There will be a much higher level of centralized support, lower travel costs, and a lower skill level required of engineers and technicians in the future.

Although labor will decline as a percent of total expenses, INPUT expects centralized management expenses, parts, and miscellaneous sales and marketing costs to increase substantially. These costs will increase as TPM vendors attempt to become more competitive and search out new markets.

2. Factors Impacting TPM Profitability

The profitability figures shown in Exhibit III-5 are averages for a large number of vendors interviewed over the last two years. In a sense, these averages are deceptive because there are so many factors which can impact profitability, even within an individual vendor's service organization. These factors include:

Cost control measures, such as centralized support, lower labor rates, and more efficient parts organization.

Service pricing which can be affected by corporate goals such as market expansion, profit maximization, etc.

Type and level of service provided by product.

The TPM vendors interviewed by INPUT indicated that all three of the factors listed above are instrumental in determining profitability of TPM service. The factor that was cited the most often, however, was profitability by the type of product serviced.

In general, vendors believe that the larger the CPU, the more profitable the account. Mainframes are generally credited as being the most profitable, closely followed by superminicomputers and departmental minicomputers. Personal computers are acknowledged to be the least profitable systems, although there are some exceptions which will be discussed below.

EXHIBIT III-5

TPM VENDOR ORGANIZATION AVERAGE EXPENSE/PROFIT PROFILE

REVENUE	1985	1990
Contracts	80%	90%
Moves and Changes	4	5
Time and Materials	16	5
Total	100%	100%

EXPENSES	1985	1990
Labor	39%	37%
Management /Administration	6	9
Parts	19	24
Travel	7	4
Overhead /Miscellaneous	4	8
Total	75%	82%

Net Profit (Before Taxes)

25%

18%

Exhibit III-6 lists the 1985-1990 average annual growth rate for the six top TPM markets in the United States. Growth in these markets is NOT equivalent to profitability, but is a necessary component in a successful TPM venture. Growth in each market varies according to a number of factors:

The mainframe TPM market is dominated by IBM products and IBM as a competitor. Constant price cuts and performance increases are making it very difficult for TPM vendors to gain market share. However, users in this market are relatively service price insensitive and profitability rates can be substantial.

Superminicomputers should be an attractive market for TPM vendors; however manufacturers such as DE, DG and Prime have been very active in protecting their installed base with a variety of service products and competitive pricing.

TPM growth in the traditional minicomputer market will be spurred on by continued sales of such well known products as the HP 3000, the DEC PDP 11 series, and the DG Nova and Eclipse lines. As the user base grows, a more substantial segmentation takes place and TPM vendors can compete primarily on service pricing and geographic proximity.

Peripherals growth is limited to 10% as a result of the continued movement toward single-source account control. TPM vendors report that growing competition from the manufacturers for

EXHIBIT III-6

THIRD-PARTY SERVICE MARKET GROWTH RATE 1985-1990

TPM MARKET	AAGR 1985-1990
Mainframes	4%
Supercomputers	3%
Minicomputers	15%
Peripherals	10%
Personal Computers	20%
Telecom	31%
Total	18%

both CPU and peripherals service is common.

There is more than enough business in Personal Computers for the major TPM vendors; however, this market is treacherous. The volume is very high, but the margins are low and even the largest TPM vendors are reconsidering their position in PC service.

Telecommunications equipment represents the fastest growing of the TPM markets, but it is also the smallest market. The growth potential will continue, however, because US companies no longer consider data/voice integration transfer as an option, but rather as an obligation. TPM vendors may have an advantage in this market because of their ability to service a variety of different manufacturers' products.

Estimated profitability by TPM market is listed in Exhibit III-7. It is obvious that profitability is not directly related to revenue growth because the most profitable TPM service markets (mainframes and superminicomputers) have the lowest growth rates. According to the TPM vendors interviewed by INPUT, each market has its own characteristics relating to profitability.

The mainframe market, as noted above, is very profitable primarily because users have a very high requirement for service and are relatively price-insensitive. In addition, mainframe products typically have a longer product life cycle than other equipment types. This provides the TPM vendor with a better opportunity to develop a price competitive service plan.

EXHIBIT III-7

PROFITABILITY OF TPM MARKET

MARKET	PROFIT (Percent)
Mainframes	20-24%
Superminicomputers	16-22
Minicomputers	10-16
Peripherals*	4-6
Personal Computers	-3-8
Telecom	0-4

*When Serviced Separately

Superminicomputer sales have increased dramatically in the last five years, and this would appear to be an excellent market for TPM vendors. As with large systems, supermini users typically have a very high requirement for service and are willing to pay substantial premiums for the necessary support. However, manufacturers have been very aggressive in protecting their installed base by developing advanced remote diagnostics, profiting from a competitive advantage in parts supply, etc. TPM vendors will find it difficult to encroach on this market until the user base increases, as is the case with products like the DEC VAX.

Profitability in minicomputers is affected by two factors. First, users are quite price sensitive, particularly at the low end, and this keeps margins relatively low. Second, there is a large installed base of these products, along with an ample supply of trained technicians and parts. A number of TPM vendors said that the 16-bit minicomputer market was a good example of a mature service market; the margins are limited, but there is adequate room for growth.

Peripherals service, when considered alone, is not particularly profitable. TPM vendors complain that local "Mom and Pop" shops tend to drive down prices for peripherals service more than in any other category except PCs. Peripherals can be profitable, however, when they are included in the CPU's service contract.

The PC market is very attractive to many TPM vendors simply because it is so large and because it is growing so quickly. But vendors who are currently involved in the market complain that the margins are very low, users are very service price sensitive, and competition is intense, particularly from local service groups. Several vendors reported that they currently service PCs only to satisfy their larger system customers and that PC service is not profitable.

Telecom service typically generates low profit margins, but INPUT believes that at this early stage, profits are not the major concern among telecom service vendors. Most of the vendors indicated that they perform telecom service primarily to ensure account control. Vendors believe that there is a tremendous profit potential in telecom service as user dependence grows.

A second factor impacting TPM profitability is the level of cost control instituted by the vendor. Many of the vendors interviewed by INPUT believe that cost control is even more important than the type of product serviced in determining profitability. These companies typically blame TPM failure on the inability to control costs. Western Union was cited by several vendors as an example of a sound TPM organization which had allowed costs to get out of control.

There are a number of ways to control costs, but in interviewing TPM vendors, a few methods kept cropping up. These include:

Reduce cost of labor.

Increase productivity.

Increase service efficiency.

Reducing the cost of labor is not an easy task and the large TPM vendors feel that the smaller companies have a definite advantage in this area. The most common method of reducing the cost of labor is to hire less experienced technicians to perform board swaps rather than highly trained engineers to do on-site repairs. One regional vendor on the West Coast said this technique helped him to reduce costs by 13% from 1983 to 1985.

Labor costs can also be reduced by increasing the productivity of the current staff. Productivity improvements generally come in the form of improved local training, greater remote support/diagnostics, improved test equipment, centralized dispatching and escalation procedures, and increased reliance on modular swapping of parts.

Many of the productivity improvements listed above have been pioneered by hardware manufacturers. In the past, TPM vendors were able to benefit from the manufacturer's staff training, parts supply, and even remote support. Today, however, the manufacturers are becoming much more proprietary in their service support technologies and TPM vendors have been forced to expand their own support structures.

Increasing service efficiency is the administrative side of improving FE productivity. Vendors indicated that administrative changes, such as centralization of remote support and parts supply, improved marketing and sales, and a corporate policy of account control, can be a very effective way of reducing costs.

A third factor impacting profitability of TPM service is the development of new service products. In the long run, INPUT believes that new products will be essential to the TPM vendor as increased competition requires differentiation between service companies.

Currently, TPM vendors derive the vast majority of revenues (over 85%) from hardware services. Other service areas, such as software support, education and training, and professional services, have been neglected primarily because growth has been limited in these areas. INPUT believes that non-hardware services will become much more important in the next 4-5 years for several reasons:

Price competition among hardware-only service vendors will increase dramatically, resulting in low margins.

Both manufacturers and TPM vendors are unbundling selected services in order to provide more contract flexibility.

As equipment becomes more reliable, users are becoming resistant to increased hardware service prices.

By expanding non-hardware related services, TPM vendors hope to avoid much of the price competition which is currently developing among smaller vendors. In a sense, the larger TPM vendors are being caught in their own trap. Vendors, such as Sorbus and CDC, gained a large market share by emphasizing lower service prices typically 10-15% lower than the manufacturer. However, as these larger TPM vendors have expanded their product coverage, efficiency has suffered and the smaller vendors are able to offer lower service prices.

Since it is unlikely that any of the larger TPM vendors will restrict product coverage, these vendors, like the manufacturers before them, have been forced to seek out new revenue sources to make up for the relative decline in hardware service prices. This market shift actually comes at an opportune time, since many users are demanding increased support, particularly in the non-hardware areas.

Exhibit III-8 demonstrates that although hardware maintenance will continue to dominate TPM revenues through 1990, non-hardware services will be growing at a much faster rate. These services include:

Software support. Growing at over twice the rate of hardware maintenance, TPM support of software is considered a major opportunity area by a number of large vendors. Although the absence of source code and frequent customization of software makes support difficult, INPUT believes that the growing demand for service will force TPM vendors to consider this market.

Vendors will concentrate on software consulting and training in order to reduce the number of user errors, estimated to cause

EXHIBIT III-8

TPM GROWTH BY SERVICES SECTOR

1985-1990

(\$ Millions)

SECTOR	1985	1990	AAGR
Hardware Maintenance	\$1,240	\$2,560	16%
Software Support	50	230	36
Professional Services	20	110	41
Educational Services	10	90	55
Total	\$1,320	\$2,990	18%

between 60 and 75% of all software problem calls.

Professional services. The second fastest growing TPM market, professional services includes planning, consulting, needs analysis, site management, etc. TPM vendors recognize that although this is a small market in terms of revenue, professional services is important in that it impacts account control. Professional services, vendors believe, will be instrumental in the integration of telecom/data processing service.

Educational services. At 55% average annual growth rate, educational services is the fastest growing of all TPM market sectors. Growth is the result of the high demand for training by end users and the emerging new technology of Computer Based Training and Computer Aided Instruction (CBT/CAI). Although capitalization costs are high for CBT/CAI, incremental costs are quite low, and INPUT believes that this will be a very profitable market segment.

Profitability within each of the TPM service sectors varies, as is demonstrated in Exhibit III-9. While hardware service continues to be profitable (average net before taxes, 22%), the margin is shrinking at an estimated 3-5% a year. The decline is caused by the inability of TPM vendors to lower costs fast enough in reaction to rapid market changes.

EXHIBIT III-9

PROFIT CHARACTERISTICS OF TPM SERVICE SECTOR

Hardware Maintenance	Margin shrinking at an average 3-5% a year--costs not declining as fast as prices.
Software Support	Margins increasing at 7-10% a year. Increasing demand for software support and centralization of service facilities are key causes
Professional Services	Margin low, but increasing at 6-8% a year. Major benefit of professional services is in account control
Educational Services	Margins increasing to 13-15% by end of the decade. Most positive impact not in profits, however, but in reduced service calls.

Software profitability is currently quite low (6-10%, on average), but the margins are increasing. TPM vendors are beginning to invest substantial sums to improve centralized service, and this is keeping short-term profitability low.

Profitability in professional services varies tremendously as a result of different corporate strategies. Some vendors interviewed by INPUT do not charge for services such as planning and consulting, but rather consider them a cost of selling. Other vendors charge for the services and report they are quite profitable (15-20% net before taxes). Overall, INPUT estimates that profitability of professional services is in the 13-15% range.

Education and training has been a breakeven proposition for the last few years. The cost of providing on-site instruction has skyrocketed, and TPM vendors have not been on the leading edge of finding new methods of keeping costs down. Margins are increasing, however, as a result of the new technology discussed above.

C. Revenue/Profitability Analysis by Vendor

1. TRW Customer Service Division

TRW's Customer Service Division is the largest independent third party maintenance vendor in the United States with revenues (estimated) of \$232 million in 1985. As Exhibit III-10 demonstrates, INPUT estimates TRW's third party maintenance profitability at 30% net before taxes, or \$70 million in 1985.

A number of factors are impacting profitability at TRW.

The company's corporate parent, TRW Inc., has targeted a 25-30% annual growth in TPM business and acquisitions appear to be a key ingredient in the growth strategy.

TRW is also developing a niche strategy in order to access high growth/profitability markets.

The company has traditionally cooperated with the equipment manufacturers in establishing service agreements. While this cooperation continues with many manufacturers, TRW has recently become more aggressive in seeking out independent service business.

Although the Customer Service Division has a great deal of autonomy, the corporate parent's goal of 30% annual growth is a strong inducement. Over the past 2-3 years, INPUT estimates that TRW's TPM

EXHIBIT III-10

TRW CUSTOMER SERVICE DIVISION PROFILE

Years Active in TPM	9
Estimated TPM Revenues (1985)	\$232 Million
Estimated Profit (Before Taxes)	30-32%
TPM Growth Rate	17-20%
Service Employees	3,000
Service Locations (U.S.)	216
Geographic Coverage	National
Products Serviced	Over 900
Customers	Over 100,000

business has been growing at 17-20% annually. In order to reach the 30% goal, INPUT believes that the company will have to be much more aggressive in acquiring other TPM vendors. Acquisitions of this sort have already begun.

TRW has purchased ICE, a Fredericksburg, VA-based TPM vendor specializing in sales and service of DEC equipment.

In mid-1985, TRW purchased Ultimate Computer Services, a leading supplier of reconditioning services for IBM equipment.

The company entered a new niche when it assumed the service operations of GDC Medical Electronics in May 1985. GDC is well known in the health care industry and is likely to serve as a base for TRW's growth in medical electronics.

Acquisitions are likely to result in substantial revenue growth for TRW, but will also have a negative impact on profitability. UCS, for example, is using TRW's financial resources to expand its service and reconditioning network, and it is likely that ICE will also expand in the near future. In the long run, this expansion is likely to be very beneficial for TRW; however, currently, profitability will be impacted.

In 1984, TRW failed in its bid to purchase Sorbus, the second largest independent TPM vendor, but INPUT believes that the company continues its search for a major acquisition to compliment the TPM business it now has.

Entering into niche markets, such as the medical field mentioned above, is likely to have a positive impact on profitability. Niche markets have a number of advantages over the general service market including reduced competition, lower end-user resistance to service price increases, and generally smaller, more efficient service organizations. INPUT expects TRW to emphasize product niches in the areas of large IBM systems and DEC VAX products and market niches in banking/finance and medical instrumentation.

The third major factor impacting service profitability at TRW is the company's product selection policy. In the past, TRW tended to concentrate on what it called "Service Management"; a process by which TRW would work closely with a manufacturer to ensure service coverage for a particular product. In many cases, such as with Altos, the manufacturer would seek out TRW because it did not have its own service organization. In other cases, as with Singer, TRW took over an existing service network. In both cases, TRW is able to report a high level of profitability due to cooperation from the manufacturer. For example:

Parts supply is often guaranteed with margins as high as 35-65%.

Field engineer training is initially performed by the manufacturer, and the manufacturer maintains technical support responsibility.

TRW is frequently involved in the initial testing of the equipment and reserves the right to reevaluated maintenance contracts based on product reliability.

As a result of the factors listed above, INPUT believes that TRW is more profitable than the industry as a whole. Whereas the industry registers approximately 25% net profit (before taxes), INPUT projects TRW's TPM profits to be in the 30-32% range.

TRW's revenue growth strategy will tend to lower profitability. As the vendor enters markets for which it has no competitive edge, profitability will decline in direct relation to the amount of competition. In order to achieve the expected growth, TRW will have to increase their concentration in hotly contested markets, such as DEC VAX and IBM mainframe products. INPUT expects TRW's profitability to drop as a result of this increase in competition, but to remain above industry levels through 1990.

2. Grumman Systems Support Corporation

Grumman has been providing third party maintenance internally to its own corporate users since 1970 and has been offering commercial TPM support since 1977. Despite the fact that the company has been in the market for almost 15 years, third party maintenance continues to be a relatively minor component of Grumman's overall business.

Corporate direction was one of the initial problems the company had in establishing its TPM operations. Grumman started servicing equipment produced by over 70 manufacturers with only 90 field engineers, almost all of whom were based in the New York metropolitan area.

Between 1979 and 1984, Grumman third party revenue increased an average of 20% a year from \$6 million to \$20 million. Although revenue growth has been consistent, TPM service lacked direction and profits were not outstanding. In the early 1980s, however, Grumman began to focus their TPM operations and improved revenues and profitability have resulted.

As Exhibit III-11 demonstrates, TPM revenue growth has increased to an estimated 25%, and profitability has increased from under 10% in the late 1970s to the 18-20% range today. The improved TPM business at Grumman is the result of several factors:

- A more focused target market.

- Expanded geographic coverage.

- Acquisitions.

EXHIBIT III-11

GRUMMAN SYSTEMS SUPPORT PROFILE

Years Active in TPM	15*
Estimated TPM Revenues (1985)	\$30 Million
Estimated Profit (Before Taxes)	18-20%
TPM Growth Rate	20-25%
Service Employees	300
Service Locations	17
Geographic Coverage	Eastern U.S.
Products Serviced (Estimate)	20
Customers	N/A

*Active in commercial TPM since 1977

The focused target market has probably had the most impact on TPM profitability at Grumman. As noted above, when the company initially introduced commercial TPM services, over 70 products were covered. The director of Grumman's maintenance arm, Alan Andrus, was quoted as saying "Anyone with a minicomputer is a potential customer."

Today, Grumman has become much more focused in product coverage. While the company does service 10 different manufacturers' product lines, they have targeted DEC and Data General mini and superminicomputers and the IBM 4300 series mainframe.

By targeting these fast growing market segments, Grumman can take advantage of a number of service factors. First, the company has access to a variety of sources for spare parts. These sources include the manufacturer, used machines, and working through the end user to get spares. Second, Grumman is concentrating on very popular machines, such as the 4300 from IBM. The installed base on these products is substantial and INPUT believes that segmentation of the user base is well developed. The third factor which will favor Grumman is the high demand for service in the superminicomputer market. In recent INPUT surveys, superminicomputer users have as high a requirement for service as mainframe users, and both groups are relatively price-insensitive.

Expanded geographic coverage is another reason that TPM profitability has increased at Grumman. As noted above, the company initiated service in the New York metropolitan area. Today, however, Grumman

services the entire East Coast. In addition, with its acquisition of Computer Systems Support Corporation (discussed below), service now extends to Chicago, San Francisco, and Seattle.

INPUT believes that expanded geographic coverage will be instrumental in revenue/profitability growth. As TPM competition increases, vendors will have to secure national accounts and comprehensive geographic coverage will be necessary. INPUT expects Grumman to continue to expand its service network with an emphasis first in the Chicago and West Coast metropolitan areas.

Acquisitions is a third area in which Grumman is likely to be active. As noted above, Grumman purchased CSSC in 1984, providing the company with established markets in the mid-Atlantic region and in Chicago. INPUT does not believe that Grumman will acquire service companies simply to increase revenue. Rather, the company's strategy is to cautiously expand the business geographically. Acquisitions will be considered when they fit into Grumman's product and geographic strategy.

INPUT does not expect any major changes in Grumman's TPM policy for the next three to five years. The company has indicated that it does not intend to enter the PC service market because of lack of profits, and will not enter the software support area because of lack of standards and confusion in the market.

Grumman has expressed an interest in entering the telecom service market. Currently, INPUT projects that this is not a particularly

profitable market, although it is growing quickly. Telecom service will not be a major direct contributor to Grumman TPM profits, but service in this area will increase revenue and account control--always a concern to regional TPM vendors.

Overall, INPUT expects Grumman TPM revenues to increase at an average annual growth rate of just under 20% through 1990. Profits will remain essentially the same (18-20% net before taxes). By 1990, INPUT estimates TPM revenues at Grumman to be \$66 million, with just over \$12 million in pre-tax profits.

D. Developing a Service Organization

Third party maintenance is exhibiting many of the classic symptoms of a mature market.

Growth in the market is beginning to stabilize.

Competition is increasing.

Consolidation is increasing, and top vendors are gaining market share.

As the market continues to mature, it will be increasingly difficult for outside vendors to successfully break into the TPM business. This is not to say that entry is impossible, as the recent TPM activities of NCR, Sperry, Honeywell, and other manufacturers have proven. It does mean, however, that entering the TPM market today will require much more capital and planning, and the willingness to forego initial profitability in order to reasonably expect success.

Activity in the TPM market has been encouraged in large part by the trend toward single-source computer service. With the advent of plug compatible products and microprocessors, the number of mixed vendor sites has increased astronomically since the early 1970s. Most manufacturers were initially unwilling to service products that they did not manufacture or at least OEM. Today, however, vendors realize that they cannot ignore the TPM service market if they are to maintain account control and service profitability.

Independent TPM vendors and manufacturers entering the TPM market typically have a "foot in the door" when it comes to establishing the TPM business. Manufacturers such as Honeywell and Sperry already had a service organization to expand. Independent TPM vendors may have started their business from scratch a number of years ago, but today they expand through acquisitions.

Acquisition, rather than "growing" a service organization, seems to be the preferred method of establishing a TPM business for a number of reasons.

As the market matures, the "window of opportunity" becomes smaller and smaller. Vendors can enter a market very quickly by purchasing an existing competitor.

Acquisition provides the vendor with ready access to experienced personnel and an established market image.

Logistics and support operations are established and can frequently supplement the acquiring vendor's operations

Although acquisitions are the most common method of entering the TPM market, some companies, such as PacTel, are developing their own internal service organizations. Companies that choose to "grow" their own organizations must be prepared to invest substantial amounts of capital for the development of a service organization. The amount of

capital will, of course, vary depending on the scope of the operations. PacTel, for example, is developing a regional organization which specializes in Data General, IBM, and Apple equipment. By restricting geographic coverage and products serviced, PacTel can limit expenditures and enter the market quickly.

In developing a third party service organization, a number of factors have to be considered:

Staff. The current trend in service staffing is to utilize less experienced technicians who can "swap boards," but who do not have the necessary experience to perform on-site, component level repairs. While there is a need for trained engineers, many TPM vendors prefer to use these highly paid FEs more on back-up duties rather than day to day customer service.

Training. As new products are added to service coverage, training must be developed to ensure a high level of service quality. Vendors such as TRW and Sorbus have invested millions of dollars in order to develop training facilities and curricula, not just to keep their own staff up to date, but also to train their customers.

Logistics. Parts supply and organization was cited as one of the most critical success factors by many of the TPM organizations interviewed by INPUT. Vendors report that an automated, centralized logistics center is necessary to control costs and at the same time provide ready access to parts.

Remote Support. With personnel costs increasing, remote diagnostics and support is seen as one of the major methods of reducing staff expenses. End users are expecting an almost immediate response time and frequently remote service is the only method of satisfying the user. However, the development of diagnostic routines can be very costly. INPUT believes that TRW acquired International Computer Equipment primarily because they had developed remote diagnostics for the DEC VAX. This is particularly important when the TPM vendor is in service competition with the manufacturer.

Proactive Administration. Increasing flexibility in contracts as well as a greater emphasis on service marketing and sales requires much more active administration today than in the past. The development of a strong service image is one of the most difficult tasks for most start-up vendors. Of course, Bell Operating Companies have an advantage here because of their service background in telecommunications. However, customer satisfaction with AT&T computer service has been very low and there is reason to question whether the computer end user is influenced by the RBOC's telecom service image.

As noted above, most vendors are acquiring established TPM companies in order to expand or enter the TPM market. In general, INPUT recommends an acquisition strategy primarily because it provides for a very focused entry into the market, and, when carefully prepared,

can provide a great deal of synergy to a company's existing computer or telecom service organization. Other benefits to acquisitions include:

Geographic/service coverage.

Skilled manpower pool.

Customer base.

Revenue volume.

Exhibit III-12 demonstrates that INPUT expects the TPM market to become significantly more competitive in the next five years. Profitability will decline by 30%, and the average number of accounts will increase by 150%. Viable TPM vendors in 1990 will be offering a much higher level of service including mandatory systems software support and product performance reporting. In addition, vendors will be involved in new service duties, such as new product launching, OEM service billing, etc.

In conclusion, INPUT believes that TPM service can be a very profitable undertaking for NYNEX. However, the market is becoming more competitive and NYNEX must be aware of the potential pitfalls. Profitability is no longer a given in corporate TPM planning, and the vendor must be aware of the impact of industry trends, particularly in the areas of profitability by product type, increased competition, and the hidden costs of internal development of service capabilities.

EXHIBIT III-12

PARAMETERS FOR LONG-TERM TPM VIABILITY 1985-1990

	1985	1990
Revenues, (\$ Millions) Minimum/Year	\$ 5	\$ 20
Revenues/Engineer (\$ Thousands/Year)	55	90
Number of Accounts	160	400
Profitability (Percent of Revenue)	15%	10%
Services Offered: <ul style="list-style-type: none"> - Hardware Maintenance - Systems Software Support - New Product Launch - Product Performance Reporting - Service Royalties 	Product Level <ul style="list-style-type: none"> Optional N/A Optional N/A 	System Level <ul style="list-style-type: none"> Mandatory Yes Mandatory Optional

